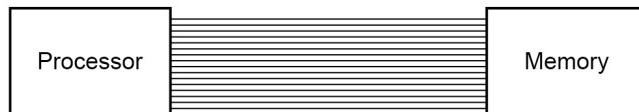




Worksheet 2 Processor performance Answers

Task 1 Word length

- Memory is divided into equal units called **words**. Each word has a separate memory address.



A processor uses a word length of 16 bits and has an address bus of 16 lines.

- What is the maximum number of addressable words in memory? $2^{16} = 65,536$
- What is the overall memory capacity in KiB? $65,536 \times 2 \text{ bytes (16 bits)} / 1024 = 128 \text{ KiB}$
- How does the width of the address bus affect system performance?
Increases the number of addressable memory spaces available // Increases the maximum amount of primary storage. This indirectly affects system performance if large data files (e.g. image files) need to be manipulated or large programs executed. Also multi-processing will be more efficient as many processes can be held simultaneously in memory.

How does the width of the data bus affect system performance? Increases the data transfer rate // number of bits that can be transferred at one time, therefore increases system performance.

- (a) Fill in the blanks from the words or phrases given below.

In computing, **word** is a term for the natural unit of data used by a particular **processor** design. A word is a fixed-sized **piece of data** handled as a unit by the **instruction set** or the hardware of the processor. The number of **bits** in a word (the **word length**) is an important characteristic of any specific processor design or **computer architecture**.

bits computer architecture computing instruction set piece of data processor word length

- Complete the table to say whether each of the following statements is true or false.

	True or False
One assembly language instruction is generally translated into several machine code instructions	False
The word length of the processor and the width of the address bus are factors in the format of a machine code instruction	True
Different types of computers have different architectures and therefore different machine code	True

Worksheet 2 Processor performance

Unit 1 Components of a computer



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instruction sets	
A processor with a 16-bit address bus cannot address more than 65,536 memory locations	True

Task 2 - Testing system performance

3. Daniel tests the performance of his computer on the website
<https://novabench.com/>

He obtains the following results:

The screenshot shows the NovaBench software window. At the top, it displays the NovaBench Score: 256. Below this, it lists system specifications: 23/04/2016 06:38:34, Microsoft Windows 10 Pro, Genuine Intel 2140 1.60GHz @ 1600 MHz, and Graphics Card: ATI Radeon HD 3450. Under the 'System RAM' section, it shows a score of 91 for 3327 MB System RAM. In the 'CPU Tests' section, the score is 127, with details like Floating Point Operations/Second: 33947358, Integer Operations/Second: 74346434, and MD5 Hashes Generated/Second: 395552. The 'Graphics Tests' section shows a score of 21 for 3D Frames Per Second: 75. The 'Hardware Tests' section shows a score of 17 for Primary Partition Capacity: 455 GB and Drive Write Speed: 22 MB/s. At the bottom, there is a link to 'See graphs, comparisons and more on NovaBench.com' and a 'Compare These Results Online' button.

He then compares them against average scores from other users:

The screenshot shows the 'STATS' page from NovaBench. It displays the following statistics for the past 3 months:
Average Score: 973
Median Score: 821
Max Score: 3591
Min Score: 96
Std Deviation: 548
of Results: 57855

Suggest possible reasons why his computer is performing poorly against the average. Is there anything he could do to improve performance?

If he has not switched his computer off for a long time, cache memory may be filled with data he is no longer using. Try switching off.

Worksheet 2 Processor performance

Unit 1 Components of a computer



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He could run a defrag utility on his disk

He could get another disk drive or SSD which might speed up disk access

If he can increase RAM that should help too.

4. Try benchmarking your own computer using the free downloadable software from the website.